

# BRAZILIAN SPACE PROGRAM

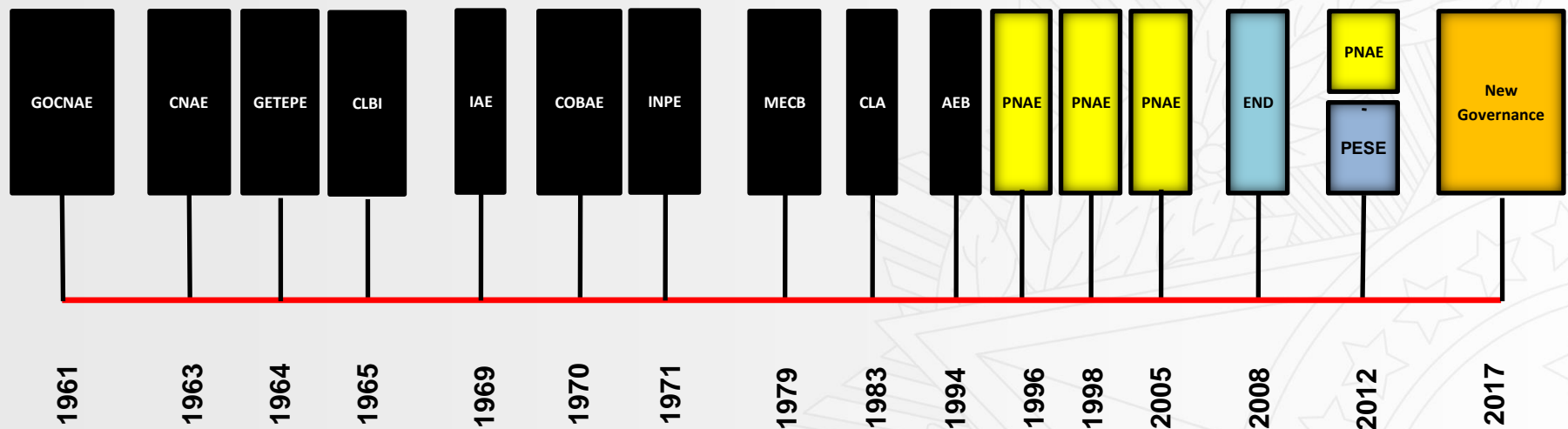


MINISTÉRIO DA  
**DEFESA**

# OUTLINE

- BRAZILIAN SPACE PROGRAM (achievements)
- NATIONAL PRIORITY PROJECTS (opportunities)
  - GEOESTATIONARY DEFENSE AND STRATEGIC COMMUNICATIONS SATELLITE 2 (SGDC-2)
  - SPACE SYSTEMS STRATEGIC PROGRAM (PESE)
  - ALCANTARA SPACE CENTER
    - ✓ Space market trends
    - ✓ Available Launch Site
    - ✓ Infrastructure expansion (aerodrome, harbor, and lodging facilities)
- AGREEMENTS

# BRAZILIAN SPACE PROGRAM



**GOCNAE – Group for the Organization of the National Space Activities Commission**

**CNAE – National Commission of Space Activities**

**GETEPE – Workgroup of Space Studies and Projects**

**CLBI – Hell's Barrier Launch Center**

**CLA – Alcantara Launch Center**

**COBAE – Brazilian Commission for Space Activities**

**IAE – Institute of Aeronautics and Space**

**INPE – National Institute for Space Research**

**MECB – Complete Brazilian Space Mission**

**PNAE – National Program of Space Activities**

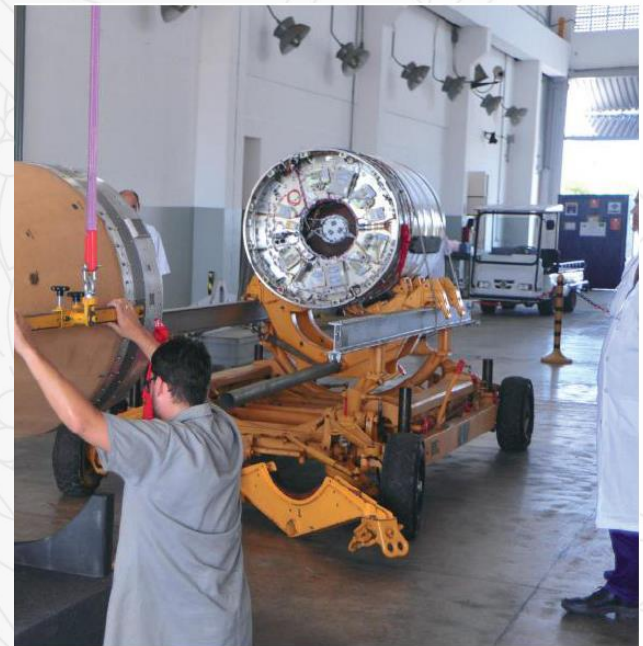
**PESE – Strategic Program for Space Systems**

# BRAZILIAN SPACE PROGRAM



## Institute of Aeronautics and Space (IAE)

- Mission: to expand knowledge and develop scientific-technological solutions to strengthen Brazilian Aerospace power through Research, Development, Innovation, Launch Operations and Technological Services in aeronautical and space systems.





# BRAZILIAN SPACE PROGRAM



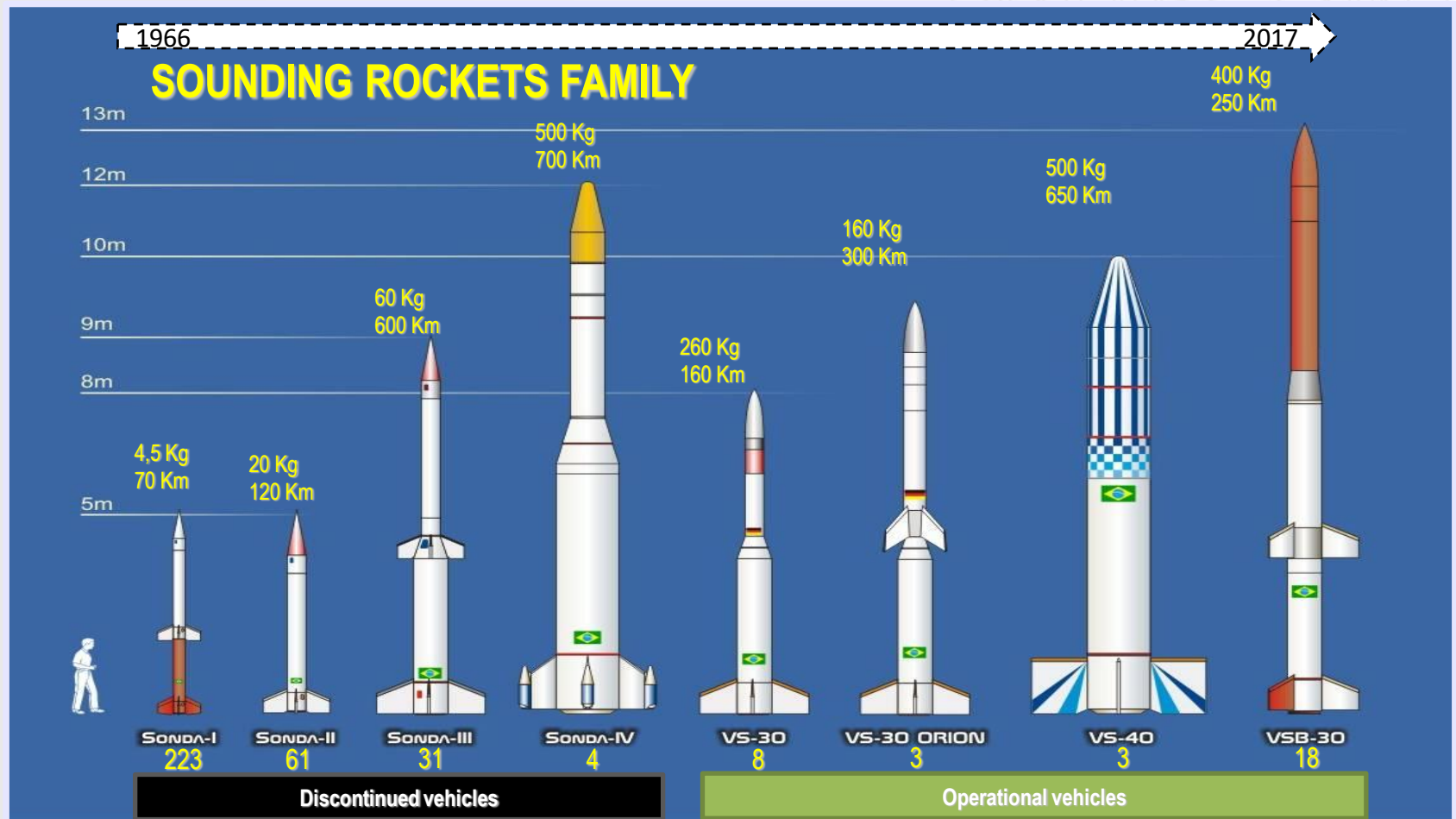
Integration and Test Laboratory at IAE



Static Fire Test S43

# BRAZILIAN SPACE PROGRAM

- Institute of Aeronautics and Space (IAE)
  - Sub-orbital launch vehicles developed





# BRAZILIAN SPACE PROGRAM

- Institute of Aeronautics and Space (IAE)
  - Orbital launch vehicles under development



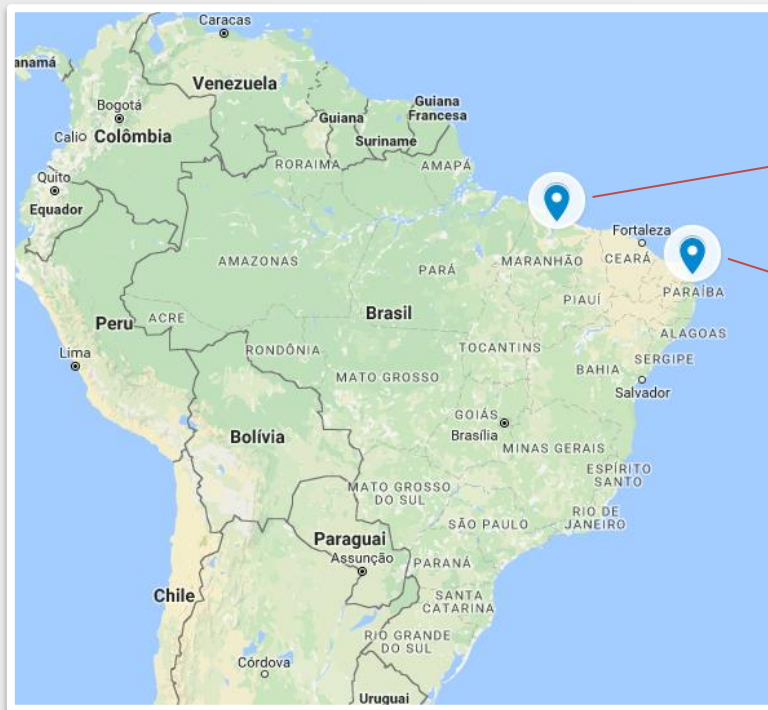
VLS  
DISCONTINUED



VLM  
WORK IN PROGRESS

# BRAZILIAN SPACE PROGRAM

## Launch Centers





# BRAZILIAN SPACE PROGRAM

## Hell's Barrier Launch Center (CLBI)

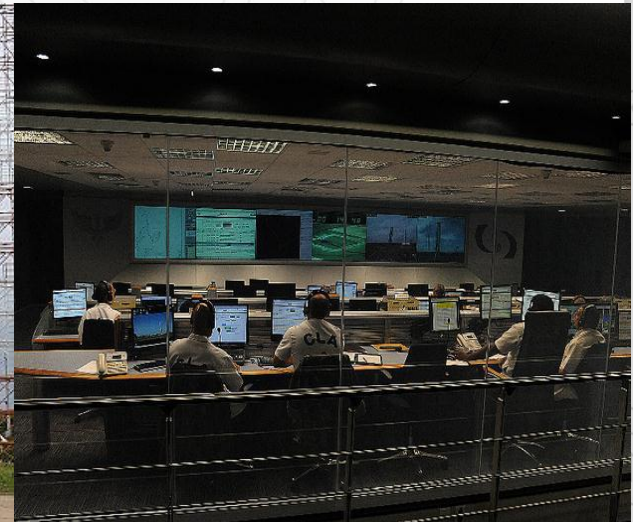
- Created in 1965 in Natal (RN)
- Nike Apache (US sounding rocket) – first launch (DEC 1965)
- More than 3000 launch operations/200 tracking operations
- Current operations
  - Training rockets launch for capability building
  - Ariane 5 cooperative tracking operations with Guiana Launch Centre



# BRAZILIAN SPACE PROGRAM

## Alcantara Launch Center (CLA)

- Created in 1983. First launch in 1990
- 475 rockets launched
- Current operations
  - Training rockets launch for capability building
  - Real sounding rockets for scientific research



# **BRAZILIAN SPACE PROGRAM**

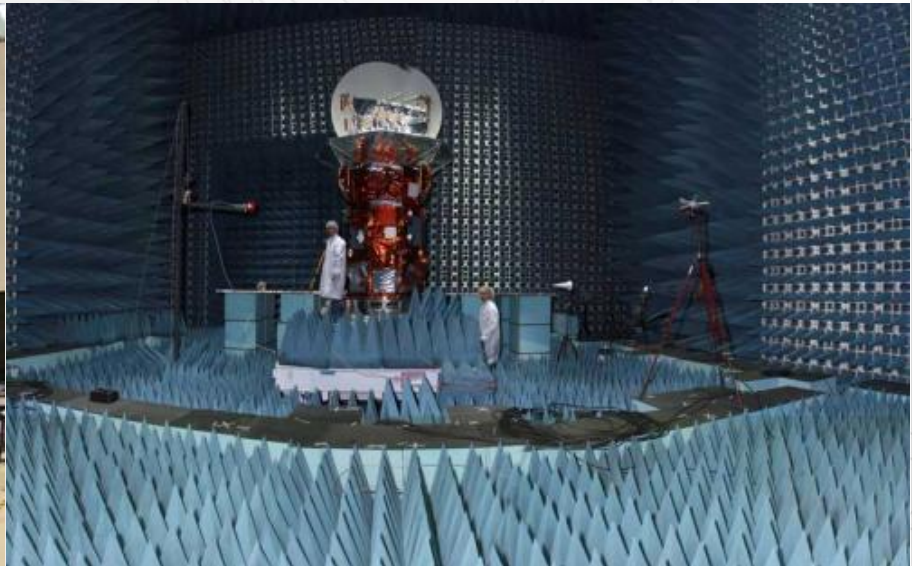
## Satellite Activities



# BRAZILIAN SPACE PROGRAM

## ➤ National Institute for Space Research (INPE)

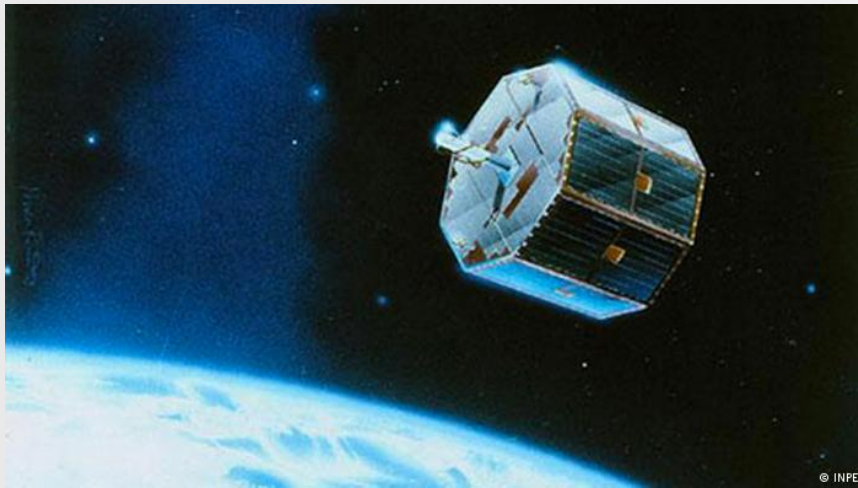
- Mission: to produce science and technology in the space and terrestrial areas and to offer singular products and services for the benefit of Brazil (emphasis in satellite research and development).
- Subordinated to the Ministry of Science, Technology, Innovation and Communications
- Integration and Tests Laboratory (LIT) for satellites



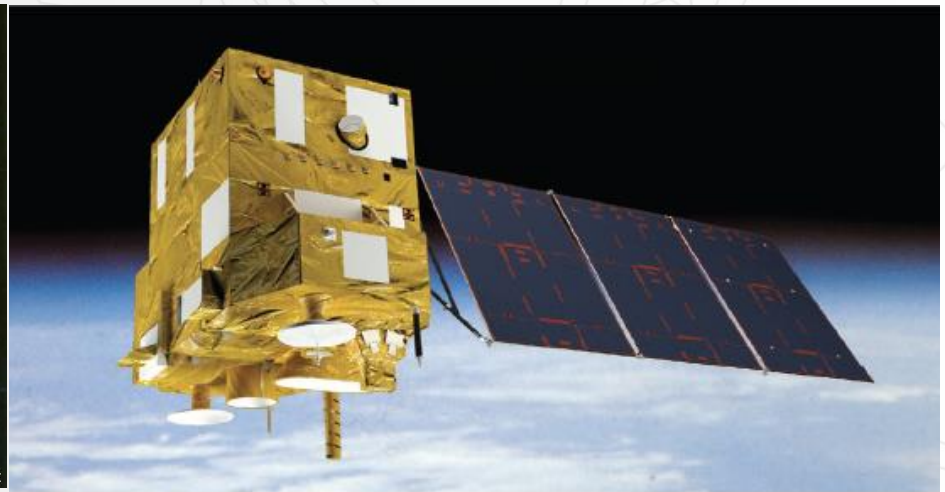
# BRAZILIAN SPACE PROGRAM

## ➤ National Institute for Space Research (INPE)

- SCD 1 and 2: Data Collection Satellites (launched in 1993 and 1998)
- China-Brazil Earth Resources Satellites (CBERS) Program: started in 1999 (four remote sensing satellites already launched)



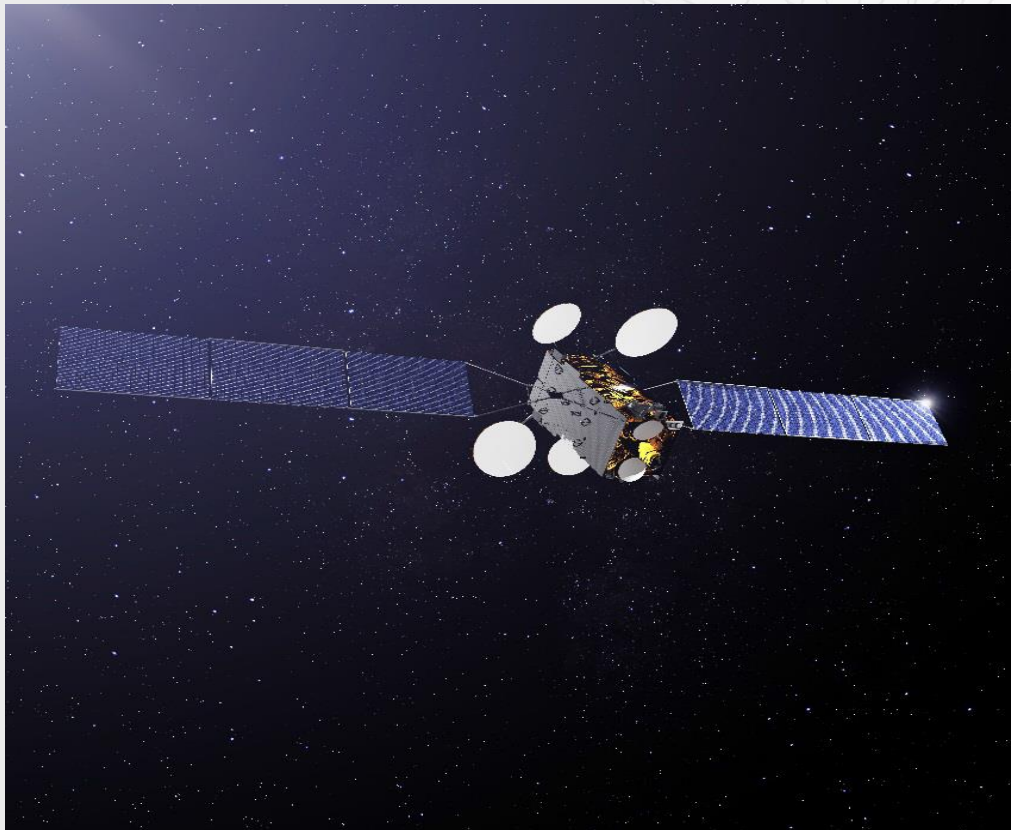
SCD



CBERS

# BRAZILIAN SPACE PROGRAM

Geostationary Satellite for Defense and Strategic Communications (SGDC-1): launched on May 4<sup>th</sup>, 2017 from Kourou, French Guiana





# BRAZILIAN SPACE PROGRAM

- Space Operations Center (COPE-P), in Brasília-DF (currently operating in provisory installations)
- Shared operations
  - Defense (X band)
  - Civilian (Ka band)





# **BRAZILIAN SPACE PROGRAM**

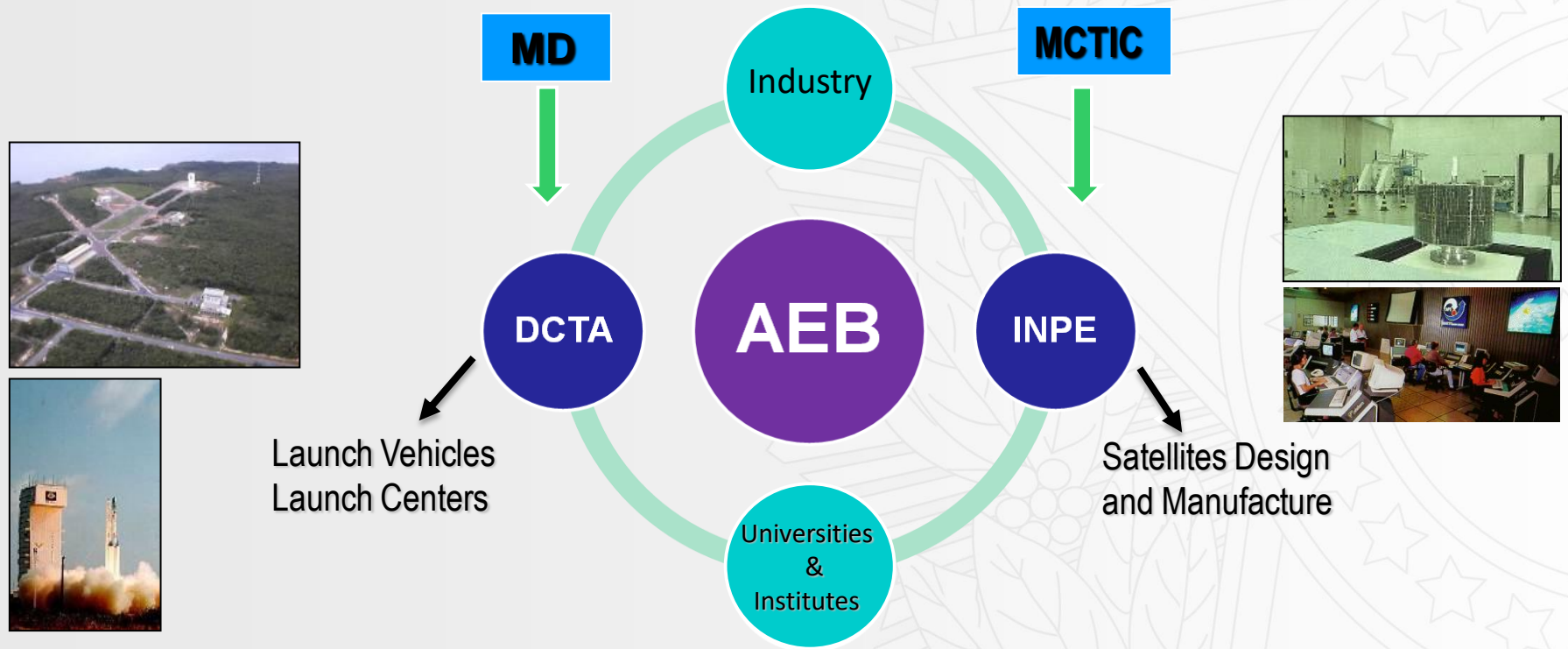
## **CURRENT AND PROPOSED GOVERNANCE MODEL**

# BRAZILIAN SPACE PROGRAM

## Current Governance Model

SINDAE – National System for Development of Space Activities

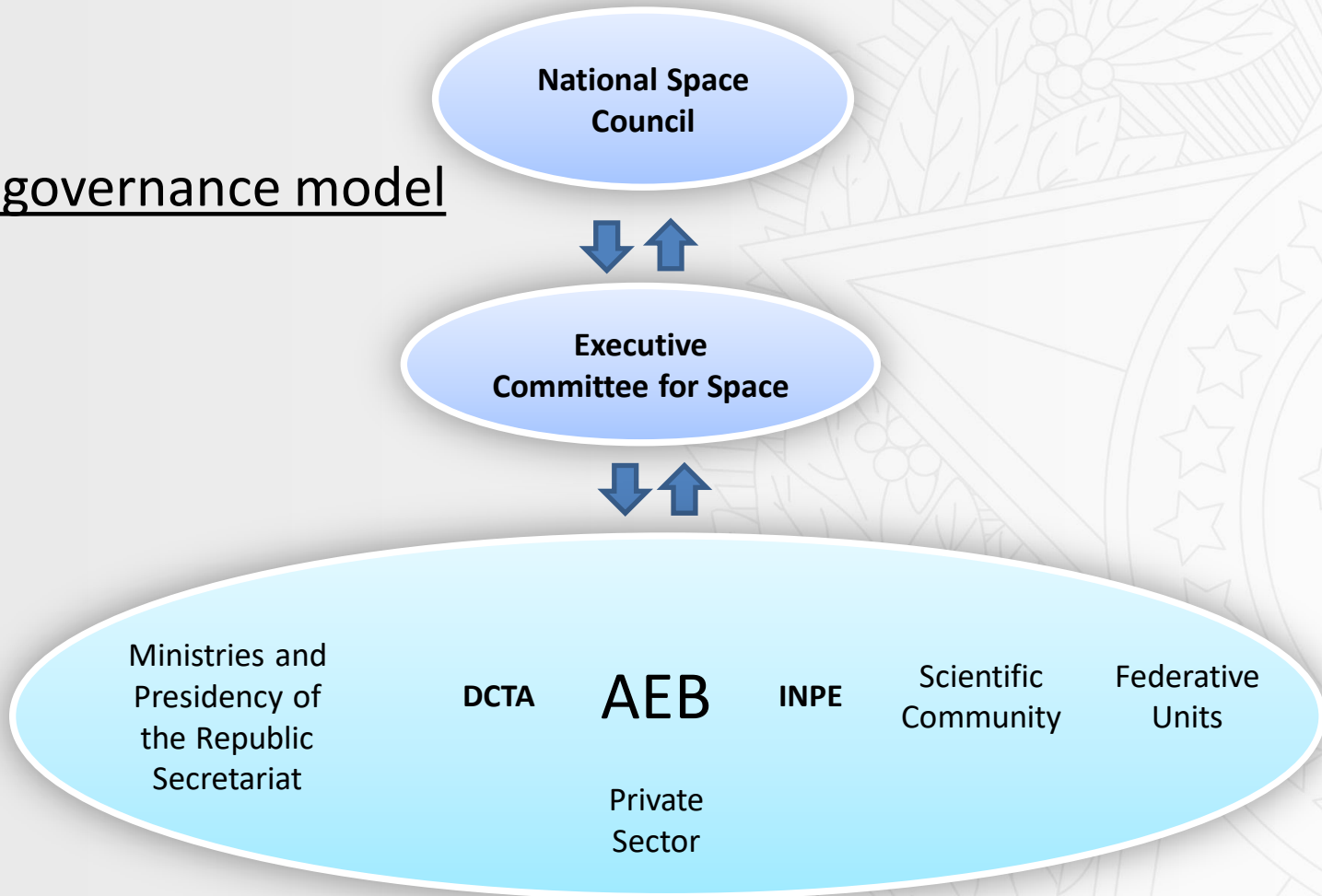
Presidential Decree # 1.953 – July 10, 1996





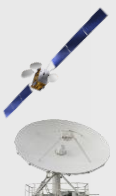

# BRAZILIAN SPACE PROGRAM

## New governance model



# **NATIONAL PRIORITY PROJECTS (OPPORTUNITIES)**

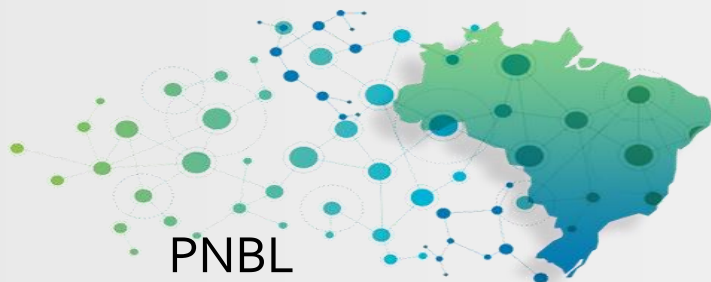
# GEOESTATIONARY DEFENSE AND STRATEGIC COMMUNICATIONS SATELLITE

2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
											

**SGDC-1**

**SGDC-2**

## STRATEGIC COMMUNICATIONS



## ADVANCED MILITARY APPLICATIONS

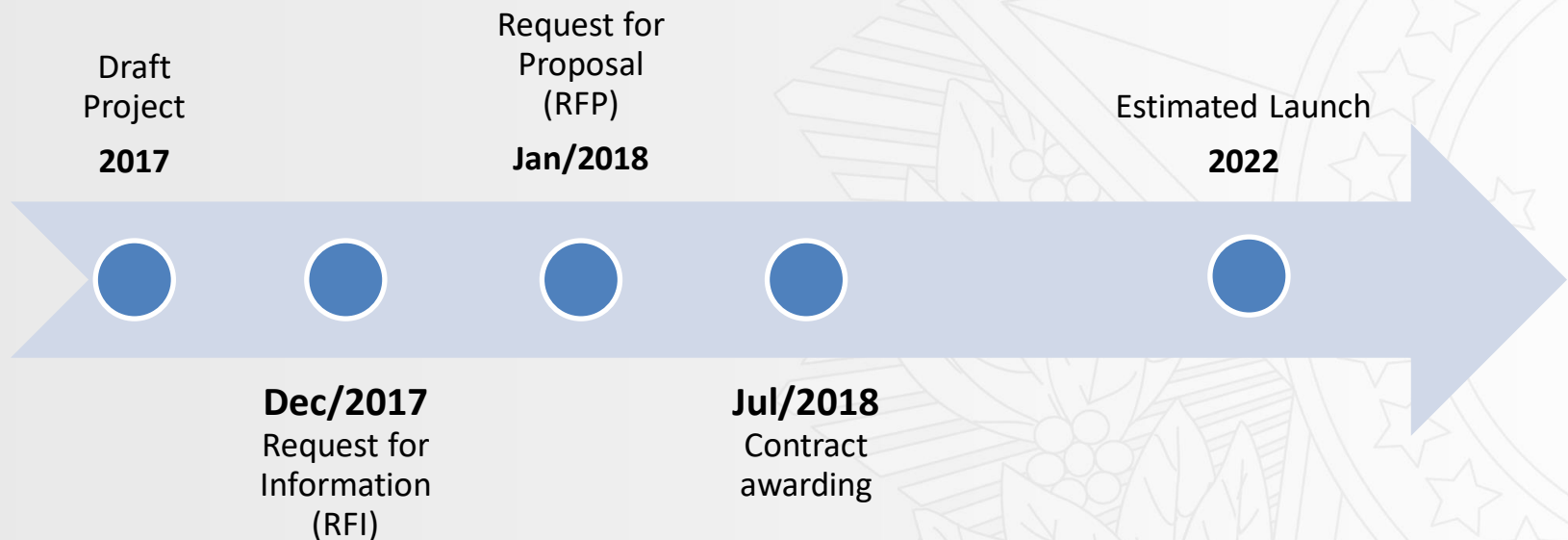




# NATIONAL PRIORITY PROJECTS

## GEOESTATIONARY DEFENSE AND STRATEGIC COMMUNICATIONS SATELLITE 2 (SGDC-2)

### Schedule



# NATIONAL PRIORITY PROJECTS

LIT's NEW FACILITIES (supporting SGDC-2 tests)

Building 1 – Satellite Integration

Building 2 – Test Chambers



Current Infrastructure LIT

# Space Systems Strategic Program



Satellite Fleets

## Space Segment

Carponis

Calidris

Lessônia

Atticora

Space Access

Launchers

Launch Sites

Space  
Operations  
Centers

## Ground Segment

COPE





Integrated use of space for the Brazilian State demands



# Space Systems Strategic Program

## SGDC-1

## SGDC-2

2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
											

Optical

Optical

## Optical Remote Sensing




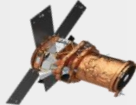
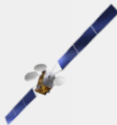

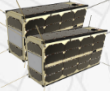
Dam Collapse – Mariana/Brazil, 2016.

# Space Systems Strategic Program

## SGDC-1

## SGDC-2

## Tactical Communication

2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
											

Optical

Optical

## Tactical Communications




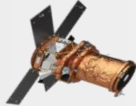
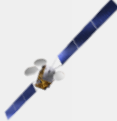

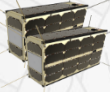

Law and Order Assurance operations (GLO,  
per its Portuguese acronym)

# Space Systems Strategic Program

## SGDC-1

## SGDC-2

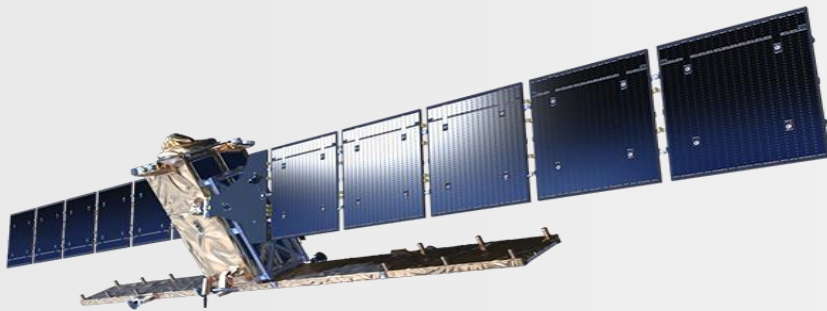
## Tactical Communication

2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
											

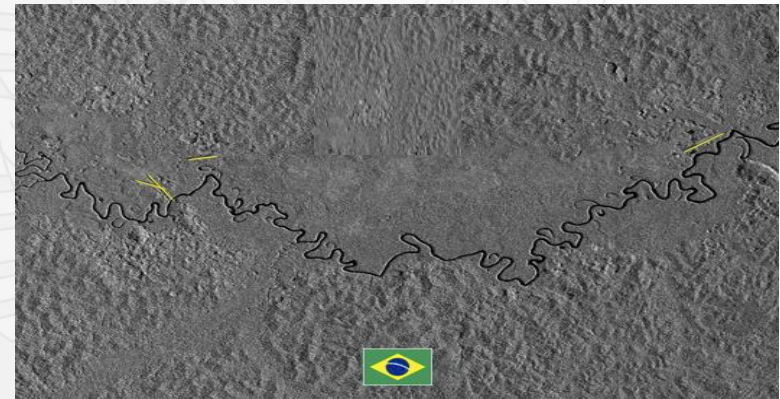
Optical

Optical

Radar



**Radar Sensing**

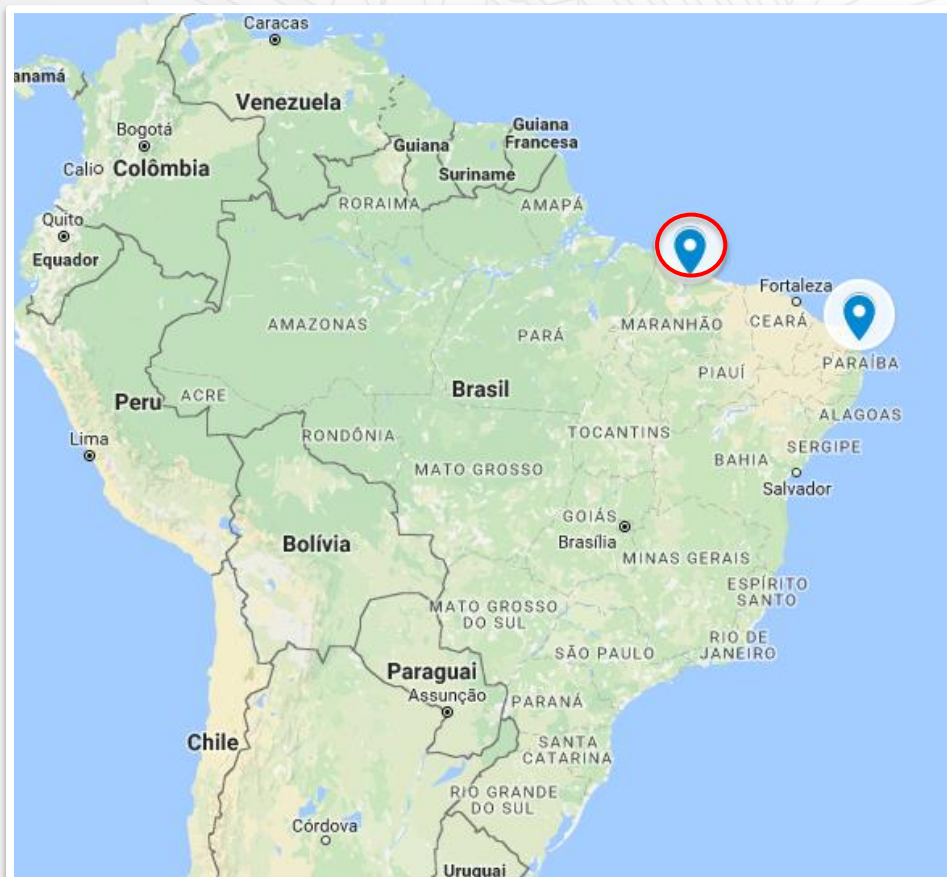


Illegal activity in the international border



# ALCANTARA SPACE CENTER

- Alcantara Space Center
  - National priority project
  - Ready for partnerships



# AEROSPACE MARKET TRENDS

# AEROSPACE MARKET TRENDS

## ➤ IN THE WORLD

- Growth of private companies on market share
- Effort to reduce launch costs
  - Reusable launch systems
  - New industrial processes and materials for launchers
  - Satellite miniaturization
  - New image processing techniques
- New customers (small companies, universities, farmers etc.)



# AEROSPACE MARKET TRENDS

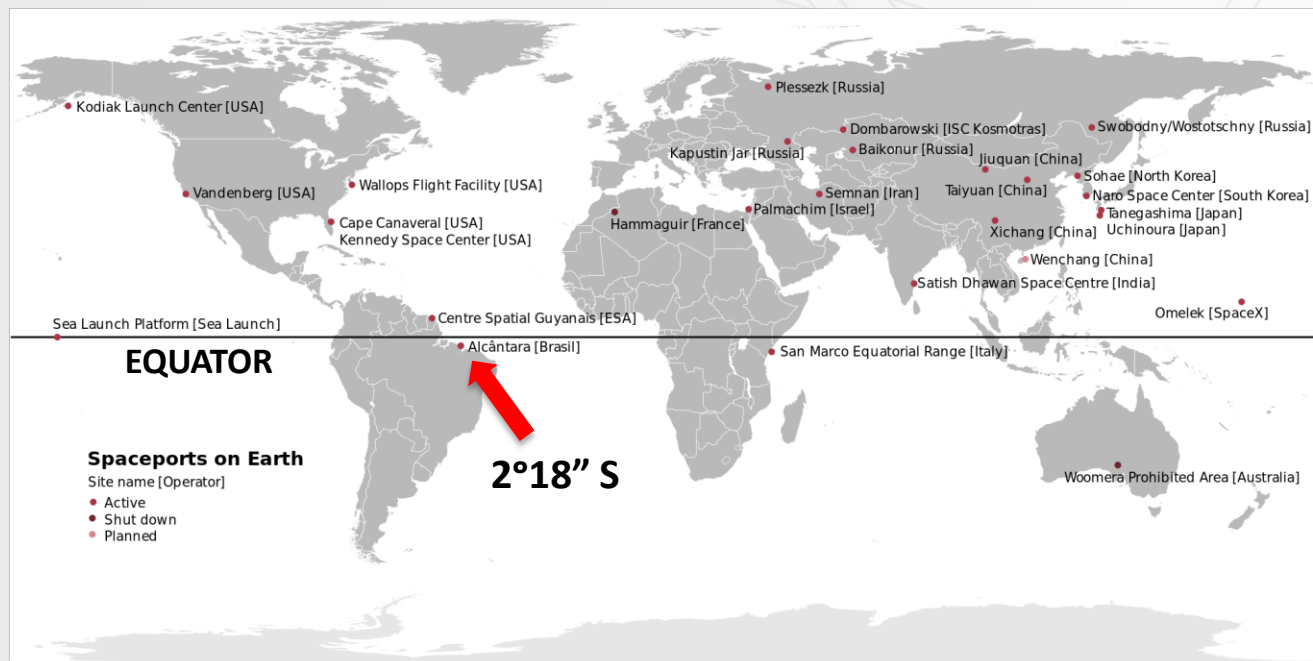
## ➤ IN BRAZIL

- Effort to improve space sector governance
- Alcantara Launch Center (CLA) modernization
- Microsatellite Launch Vehicle (VLM) development

# ALCANTARA SPACE CENTER OPPORTUNITIES

## Alcantara Space Center

- Best location for rocket launch operations  $2^{\circ}18''$  S  
(fuel efficiency, good weather conditions year wide, availability for new sites)



# NATIONAL PRIORITY PROJECTS

## Alcantara Launch Center (CLA) modernization



Command and Control Center

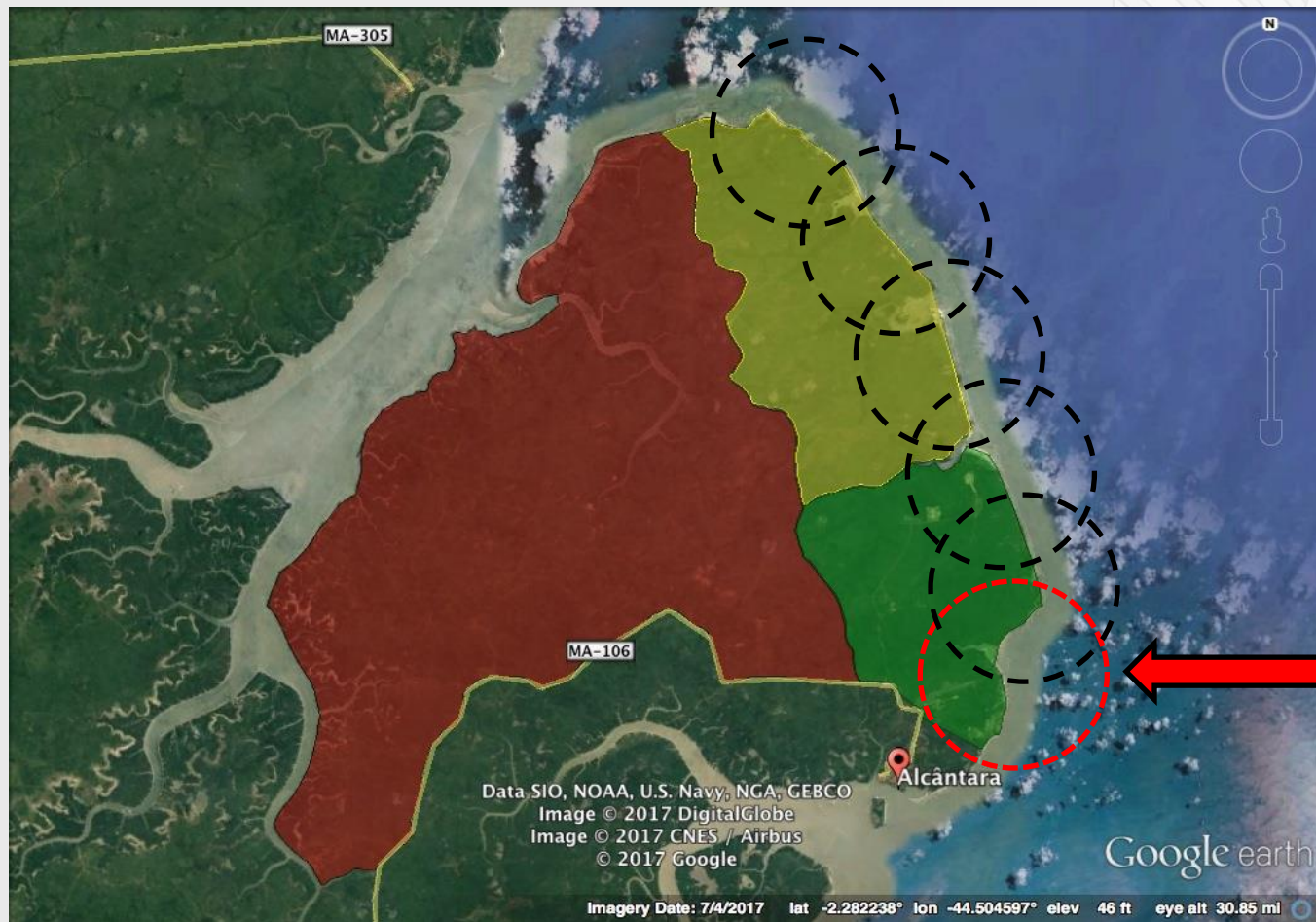


# NATIONAL PRIORITY PROJECTS

## Alcantara Launch Center (CLA) modernization



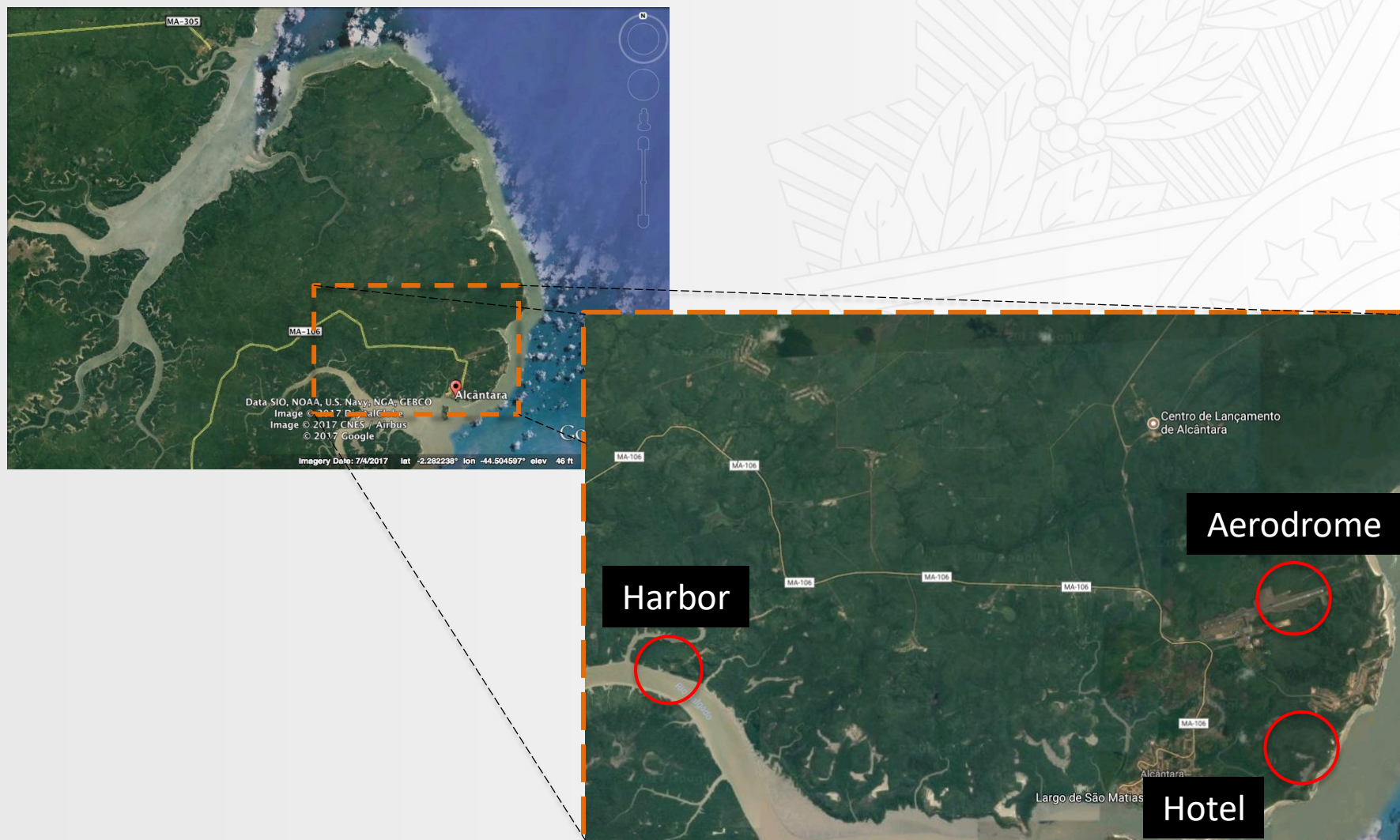
# AVAILABLE LAUNCH SITE



Launch Site  
available  
for partners



# INFRASTRUCTURE PROJECTS





# INFRASTRUCTURE PROJECTS

## Aerodrome Infrastructure



# INFRASTRUCTURE PROJECTS

## Aerodrome





# INFRASTRUCTURE PROJECTS

## Harbor Area



# INFRASTRUCTURE PROJECTS

## Harbor





# INFRASTRUCTURE PROJECTS

## Hotel



# AGREEMENTS

# AGREEMENTS

## ➤ AGREEMENTS (Brazil – USA)

- Framework Agreement for Defense Cooperation
  - Description: Umbrella agreement for Defense cooperation on mutual interest areas.
  - Current Status: In force since April 2010
- General Security of Military Information Agreement - GSOMIA
  - Description: Mutual cooperation to assure classified military information protection.
  - Current Status: In force since June 2015
- Joint statement creating bilateral defense committee
  - Description: Promote the strengthening of mutual trust on Defense and exchange of views.
  - Current Status: Signed on November 1999
- Master Information Exchange Agreement – MIEA
  - Description: Exchange information on Defense research and development
  - Current Status: Signed on March 2017

# AGREEMENTS

## ➤ AGREEMENTS (Brazil – USA)

- Basic Exchange Cooperation Agreement - BECA
  - Description: Exchange of geospatial information for Defense and other government interests.
  - Current Status: Signed on March 2016
- Engineer and Scientist Exchange Program - ESEP
  - Description: Identify work opportunities for engineers and scientists on military projects.
  - Current Status: Under analysis since April 2017 in USA
- Memorandum of Understanding for sharing spatial situation awareness services and information
  - Description: Identify opportunities for engineers and scientists on military projects.
  - Current Status: Under analysis since November 2015 in BR
- Research, Development, Test and Evaluation Program – RDTE
  - Description: Exchange information on research and development.
  - Current Status: Counter-proposal under analysis since August 2017 in BR



# AGREEMENTS

## ➤ AGREEMENTS (Brazil – USA)

- Letter of intent for Defense Industry Dialogue
  - Description: Consolidate bilateral support for Defense industry cooperation.
  - Current Status: Signed on September 2016
- Technology Safeguards Agreement – TSA
  - Description: Reciprocal agreement for technology protection.
  - Current Status: Counter-proposal under analysis since May 2017 in US

# BRAZILIAN SPACE PROGRAM

**For more information please contact**

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